Eaton Corporation
Controls Division
191 East North Avenue
Carol Stream, Illinois 60187
Telephone (312) 260-3400

MODEL 400
MOISTURE TESTER

Theory of Operation

The basic principle of operation of Dole Moisture Meters is that of measuring the effective dielectric constant of the grain as it alters the electrical capacity between two plates of a capacitor. Measurement is made at approximately 2 Megacycles in frequency, so that the impedance of a relatively small cell is of significant measurable value.

Electrically, grain appears like a capacitor of 0 to 20 p.f. in parallel with a 10K ohm resistance. Capacitance varies with amount of moisture present. The dielectric constant of water is 80, while air is 1 and starches and cellulose is 1 to 4. The curve of percent moisture vs. capacitance is non-linear and varies from one grain type to another. The resistive component is in reality energy absorption and will cause a higher moisture reading than that due to the dielectric constant alone. In calibration, this effect is corrected to insure highest accuracy.

Background

The product was first developed by Radson in 1955. Numerous model changes have been made in the intermediate years. The early models were tube types, but all current ones employ solid state circuitry. The current models are PB-70 Dole Model 400 and PB-71 for private label accounts. Both are identical except for styling of the housing. These models employ a 9 volt transistor battery or an optional A.C. plug in supply.

Circuit

The circuit shown is Schematic BD-28305. A 2 MHz transistor oscillator drives a capacitance ratio circuit, which consists of an isolated A.C. voltage source (oscillator transformer secondary) and two capacitive ratio arms, one of which consists of the main dial capacitor and measuring cell along with curve shaping and trimming capacitors (C4, C5, C7, C8, C9, C15 and Cell) while the other arm contains the reference and calibration capacitors (C6, C16 and C10). Two diode detectors are used in opposition to drive a microammeter null indicator. The detectors drive a positive current into a virtual ground (not an actual D.C. ground) therefore, resistors R_2 and R_3 are employed to return unbalanced, opposite polarity currents to the source.

Cont.....

MOISTURE TESTER

Circuit - Cont.

In general, the grain test cell is in parallel with the variable capacitor and represents one side of the capacitive divider network. A fixed capacitor represents the other side. When the two sides of the capacitor divider are equal in impedance, the voltages at the output of the detector diodes are positive and equal, causing a zero current or nell condition. It is quite important that the dial alignment is set to correspond to the balance point to eliminate errors due to battery voltage magnitude, transistor characteristics, stray capacity, etc.

The oscillator circuit is quite critical in that the primary and secondary of the transformer are overcoupled to produce a double resonance "hump at the secondary. The circuit is tuned to the lower or minor resonance peak to provide stable circuit operation. Resistor R_7 is also used to lower the circuit Q and improve stability.

Some other specifics of the circuit are the use of capacitor C9 for D.C. blocking and curve shaping for the test cell; a 33K (R_6) resistor across the test cell to swamp the affects of surface moisture on grains; and dial curve shaping capacitor C_4.

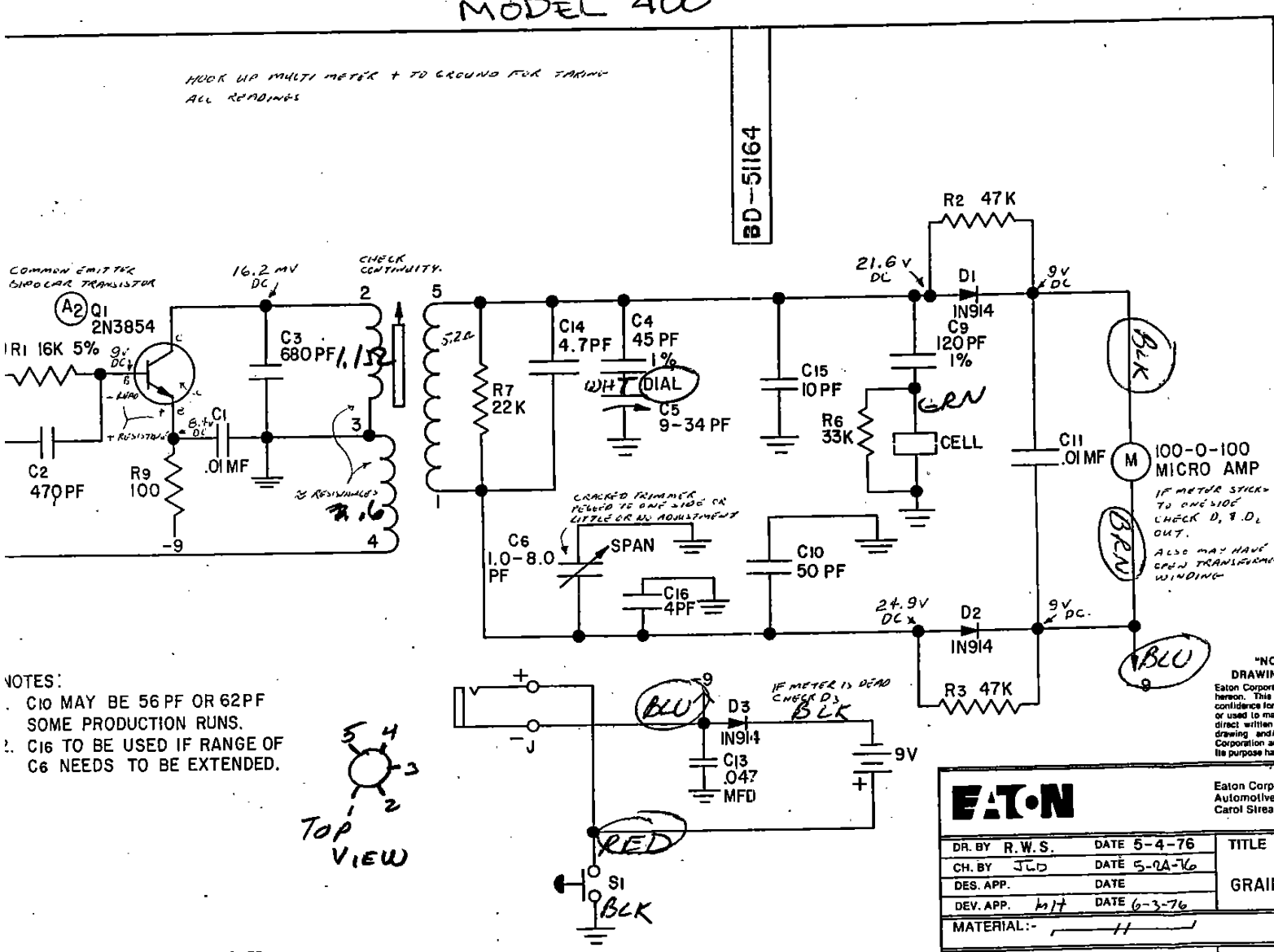
M. Hamilton
MH/cb

1-17-75

MODEL 400

BD-51164

HOOK UP MULTI METER + TO GROUND FOR TAKING ALL READINGS



NOTES:

1. C10 MAY BE 56 PF OR 62 PF SOME PRODUCTION RUNS.
2. C16 TO BE USED IF RANGE OF C6 NEEDS TO BE EXTENDED.

(REF. DWG. BD-28305)

REVISIONS	E.C. DATE
A1 R1 WAS 18K	1-5-77
A2 Q1 WAS 2N3393	3115-1

JAN 8 1980

EATON
Eaton Corporation
Automotive and Appliance Controls Operation
Carol Stream, Illinois 60187

DR. BY R.W.S.	DATE 5-4-76	TITLE	SCHEMATIC GRAIN MOISTURE METER
CH. BY JCD	DATE 5-24-76		
DES. APP.	DATE		
DEV. APP. MH	DATE 6-3-76		
MATERIAL:-			
RELS'D.:-DATE 6-1-76 AUTH. 2753-1		DWG. No.	BD-51164
SCALE:-			

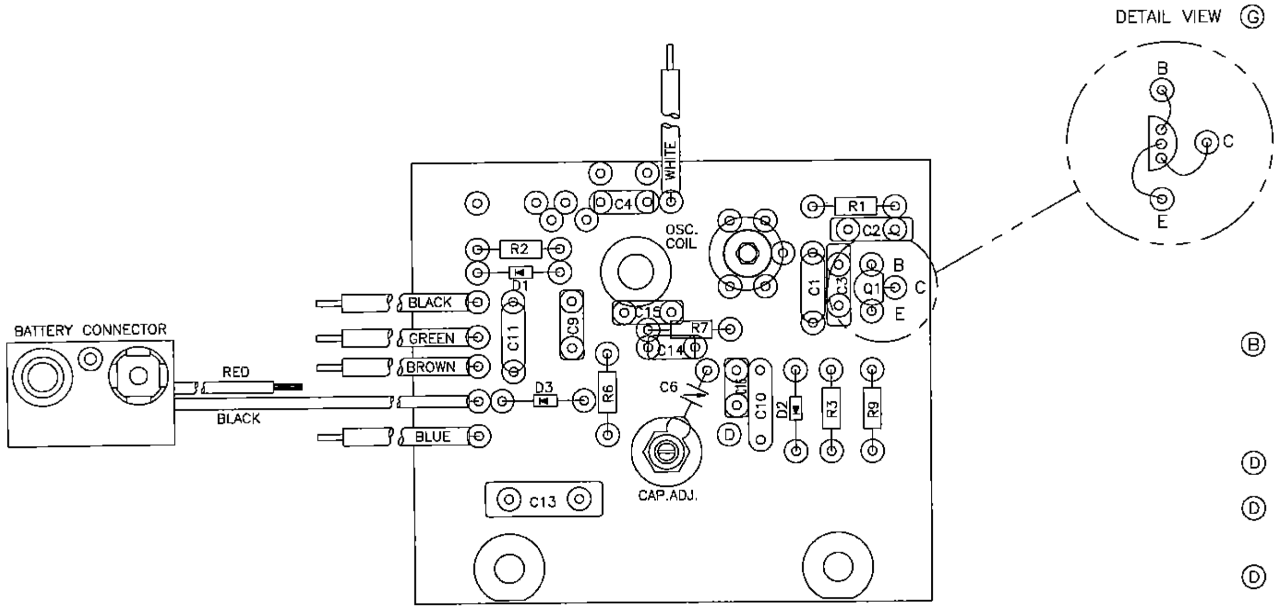
ERANCES - UNLESS OTHERWISE SPECIFIED ARE:
PLACE DECIMALS (.XX) ±
EE PLACE DECIMALS (.XXX) ±
ULAR ± 1°

DO NOT SCALE DRAWING

ALL CHANGES TO DRAWING MUST BE DONE ON CAD

C-32410 REV.

THIRD ANGLE PROJECTION



(D) NOTE: REMOVE C16 IF RANGE OF C6 NEEDS TO BE REDUCED.

	DET. NO.	PART NO.	DESCRIPTION		REQ'D.
	25	B32409	COIL		1
(B)	24	A32411	PC BOARD		1
	23	122-1001	CAPACITOR 10PF	(C15)	1
	22	122-1202	CAPACITOR 120PF	(C9)	1
	21	122-4501	CAPACITOR 45PF	(C4)	1
	20	122-4702	CAPACITOR 470PF	(C2)	1
(D)	19	122-5000	CAPACITOR 5PF	(C14,C16)	2
	18	122-6802	CAPACITOR 680PF	(C3)	1
(D)	17	136-4705	CAPACITOR .047MF	(C13)	1
	16	137-5001	CAPACITOR 50PF	(C10)	
	15	141-1004	CAPACITOR .01MF	(C1,C11)	2
(D)	14	150-0002	CAPACITOR ADJUST	(C6)	1
	13	195-084	BATTERY CONNECTOR		1
	12	310-914	DIODE 1N914	(D1,D2,D3)	3
(F)(E)	11	320-3855	TRANSISTOR 2N3855	(Q1)	1
	10	452-1002	RESISTOR 100 OHM	(R9)	1
	9	452-1604	RESISTOR 16K	(R1)	1
	8	452-2204	RESISTOR 22K	(R7)	1
	7	452-3304	RESISTOR 33K	(R6)	1
	6	452-4704	RESISTOR 47K OHM	(R2,R3)	2
	5	595-4505	WIRE GREEN		.5FT
(D)(C)	4	595-4509	WIRE WHITE		4583FT
	3	595-4601	WIRE BROWN		.625FT
	2	595-4610	WIRE BLACK		.625FT
	1	595-4613	WIRE BLUE		.875FT

REVISIONS

SYM.	ECN NO.	CHG'D.	APP'D.	DATE	DESCRIPTION
A	5752	SW		[illegible]	REDRAWN ON CAD REMOVED DASH 2 PARTS
B	5847	SW		[illegible]	DET #24 PART NO. WAS C32411
C	5857	SW		[illegible]	DET.1 THRU 5 QTY'S REVISED.
D	6044	MA		[illegible]	[illegible]
E	6510	JW		[illegible]	CHANGED ITEM #11 FROM 2N3855 (320-3855) TO A 2N4401 (320-4401)
F	6775	JW		[illegible]	CHANGED ITEM #11 FROM 320-4401 (2N4401) 320-0010 (MPSH-10)
G	6946	MJ		[illegible]	ADDED DETAIL VIEW TO SHOW PROPER WIRING.

EATON Lebow Products

Eaton Corporation Physical Measurement Products Troy, Michigan

UNLESS OTHERWISE SPECIFIED
LINEAR DIMENSIONS ARE IN INCHES
ANGULAR DIMENSIONS ARE IN DEGREES
DIMENSION LIMITS HELD AFTER PLATING

REMOVE ALL BURRS & SHARP EDGES
SURFACE FINISH 125 √

TOLERANCES

DRILLED HOLES	TWO PLACE DECIMALS	THREE PLACE DECIMALS	ANGLES	DR. BY: SW	CHK'D. BY:	ENGR.
-.000 +.007	± .010	± .005	± 0° 30'	DATE: 10-16-92	DATE:	DATE:
SCALE: NONE	REF. DWG.	JOB NO.	MAT'L. NOTED	MODEL: 8400		

TITLE: AC/DC MOISTER METER PC BOARD

DRAWING NO. C-32410 REV.

Lebow
Physical Measurement
Products

Eaton Corporation
P.O. Box 1089
Troy, MI 48099-1089
Telephone (313) 643-0220

1728 Maplelawn Road
Troy, MI 48084-4600

MODEL 400 MOISTURE TESTER

DIAL REMOVAL/REPLACEMENT

REMOVAL:

1) REMOVE SCREWS HOLDING FIDUCIALS IN PLACE.

2) REMOVE HUB BY GRASPING WITH PLIERS, ROCKING BACK AND FORTH WHILE PULLING UP ON HUB.

3) LOOSEN THE SET SCREW HOLDING THE DIAL ASSEMBLY TO THE SHAFT AND REMOVE DIAL ASSEMBLY.

INSTALLATION:

1) PLACE NEW DIAL ASSEMBLY ON SHAFT, DO NOT TIGHTEN SET SCREW.

2) RE-INSTALL FIDUCIALS.

3) LINE UP FINS ON VARIABLE CAPACITOR, SO THAT ALL ARE EVEN.

4) LINE UP MARK LOCATED UNDER "SCALE A" WITH LINE ON BOTTOM FIDUCIAL. TIGHTEN SET SCREW.

5) CHECK TO INSURE THAT WITH THE ALIGNMENT IN STEP 4 THAT THE FINS ON THE VARIABLE CAPACITOR ARE STILL EVEN. IF NOT, REPEAT STEP 4.

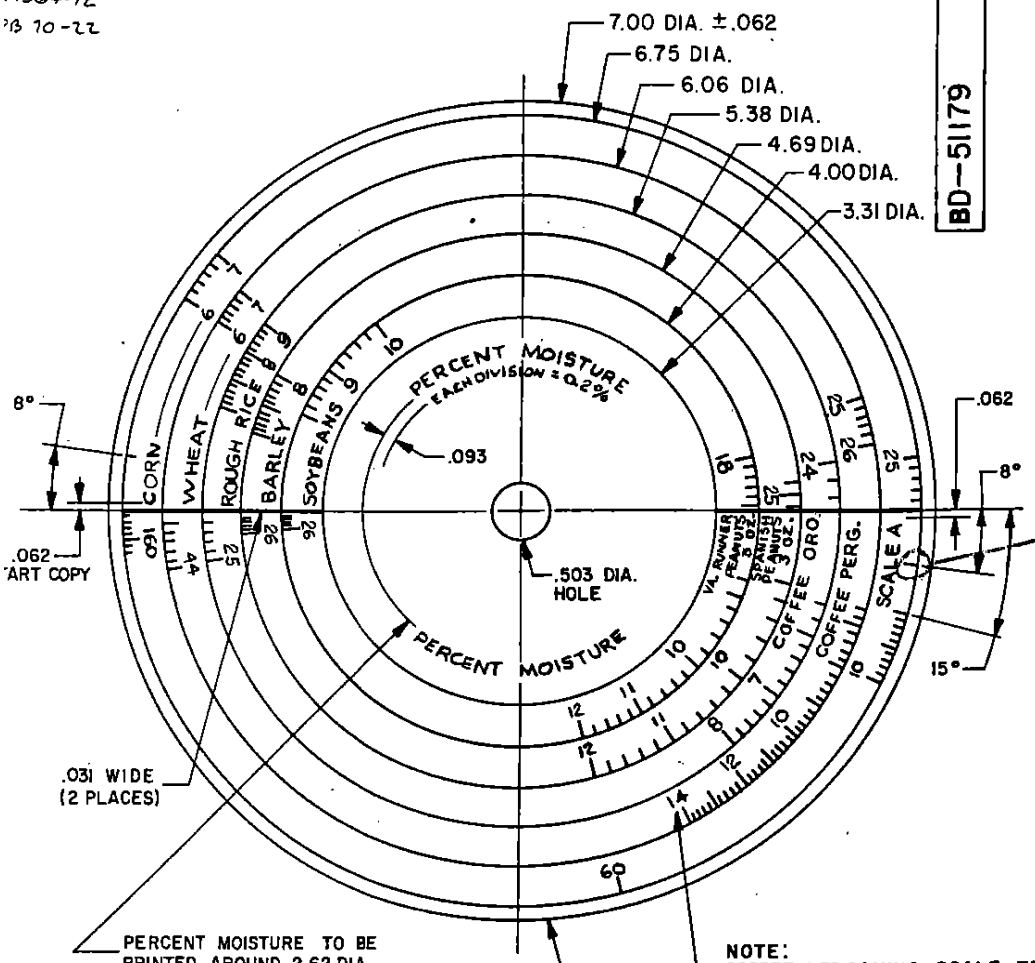
6) CAREFULLY PRESS ON HUB.

IF YOU ARE CAREFUL IN DOING THE ABOVE PROCEEDURES NO RE-CALIBRATION IS REQUIRED.

Fax (313) 643-0259 Teletype (810) 232-4818

77564-12
B 10-22

BD-51179



Alignment Mark

PERCENT MOISTURE TO BE PRINTED AROUND 2.62 DIA.

NOTE:
FRONT SURFACE TO BE FREE FROM SCRATCHES, ETCHING IMPERFECTIONS AND ALL SURFACE BLEMISHES.

NOTE:
COFFEE PERGAMINO SCALE TO BE NUMBERED AT EVERY OTHER FULL PERCENT MOISTURE BEGINNING A 10%. ALL OTHER GRAIN SCALES TO BE NUMBERED AT EVERY FULL % MOISTURE.

NOTES:
1. ONE DIVISION SCALE "A" = 1°, TOTAL OF 165 DIVISIONS = 165°.
2. FOR EACH GRAIN'S COMPLETE % MOISTURE SCALE AND CORRESPONDING SCALE "A" READING SEE DOLE DRAWING Nº. B-20-588.
3. INDICES AT EVEN 1% INTERVALS. AND 5°, SCALE A — .125 LONG. ALL OTHER INDICES — .078 LONG.
4. ALL DIVISION CIRCLES TO BE .023 WIDE. ALL INDICES — .015 WIDE.
5. MARKINGS TO BE BLACK ENAMEL.
6. COVER OVERALL WITH EPON BASE VARNISH.
7. DIVISION CIRCLES AND O.D. OF PLATE TO BE CONCENTRIC WITH .503 DIA. HOLE WITHIN .015 T.I.R..
8. "EACH DIVISION = 0.2 %" & PEANUT COPY TO BE .062 FUTURA DEMIBOLD. ALL OTHER CHARACTERS TO BE .093 FUTURA DEMIBOLD TYPE.

MATERIAL:
.032 THICK 52S-H32 ALUMINUM. TO BE FLAT WITHIN .031 T.I.R..

FINISH:
MARKINGS TO BE ETCHED .003 TO .005 DEEP. BREAK EDGE, MARKING SIDE.

ALTERNATE MATERIAL:
.032 THICK ANODIZED FOTO SEAL ALUMINUM. TO BE FLAT WITHIN .031 T.I.R.. FINISH — SATIN; MARKINGS TO BE PHOTO ETCHED. BREAK EDGE, MARKING SIDE.

REVISIONS	E.C. DATE
B-32526	

EATON
Eaton Corporation
Automotive and Appliance Controls Operation
Carol Stream, Illinois 60187

DR. BY R.W.S.	DATE 5-20-76	TITLE	MODEL 8400 DIAL PLATE
CH. BY JLO	DATE 5-24-76		
DES. APP.	DATE		
DEV. APP. MH	DATE 6-2-76		
MATERIAL:- AS NOTED			
RELS'D.:-DATE 6-1-76	AUTH. 2753-1	DWG. No.	B-32526
SCALE:- FULL			

.ERANCES - UNLESS OTHERWISE SPECIFIED ARE:
D PLACE DECIMALS (.XX) ± .010
REE PLACE DECIMALS (.XXX) ± .005
GULAR ± 1°

(REF. DWG. B-20-586)

EATON

Process Instruction Sheet

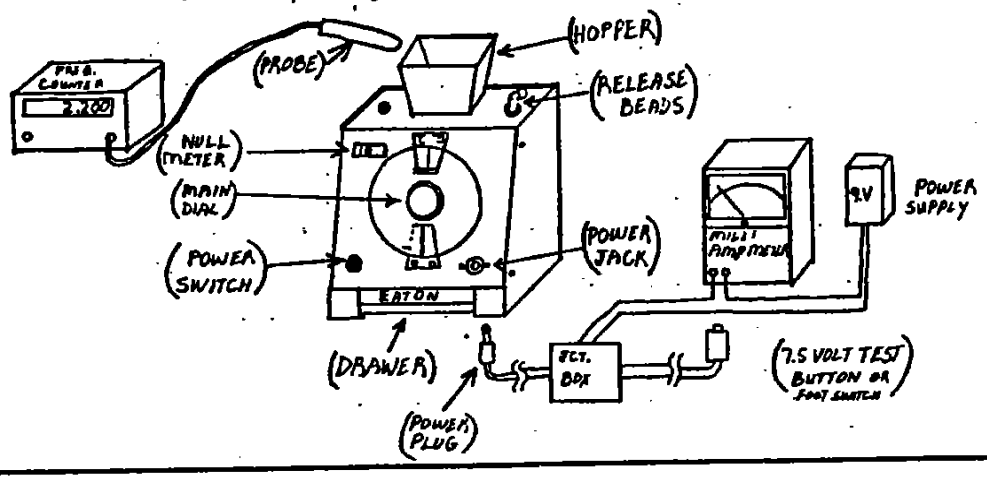
Part No. PB-70-All
Operation No. 0020 7516
B/P Revision

Prepared By: J. Willett
Approved By: M. Hamilton MH.
Part Name: Moisture Meter
Date: 10/18/84 Issue: Sheet 1 Of 1
Operation Description: Calibrate Moisure Meter

Tool and Gage Numbers	Description	Tool and Gage Numbers	Description
	Simpson 260 Meter		Bead Sample
	Power Supply		Padded Drawer
	Tuning Wand		
	3/32 Screwdriver		
	Cal. Fixture		
	Bead Release Hopper		

Sketch

IMPORTANT: Check bead sample in standard meter prior to calibrating production meters. Add beads when necessary. Retest beads every 2 hours or more frequently if bead loss is suspected.



Instructions

1.	Connect power to meter thru front panel jack. Press power switch and note current draw. If draw is over 10 ma. put meter aside for analysis. If less than 10 ma. - continue.
2.	Assemble release hopper to moisture meter hopper. Pour in calibrated bead sample and press lever to drop beads into the cell.
3.	Adjust main dial to "A" scale 23. Assume coil is tuned close to first peak from previous test. Turn coil slug CCW while monitoring milliamp meter. Current should decrease. Readjust CW till current is maximum.
4.	Adjust trimmer capacitor till point of null meter is centered in "Ball".
5.	Press switch to drop power supply voltage to 7.0 volts. Turn main dial to bring null meter to balance if it changed. Main dial reading must be "A" scale 23 ± 2 divisions. Retune coil if necessary while actuating 7.0 volt switch. Monitor null meter for decreasing movement while switching between 7.0 and 9 volts. Readjust trimmer capacitor for "A" scale 23 ± 2 divisions.
6.	Place frequency meter probe in cell. Frequency must be 2.20 ± .2 OMHZ.
7.	Verify battery operation, release beads to padded drawer and ass'y final drawer.

Special Notes: The first meter of a days run should be checked by Q.C. as soon as possible after calibrating to verify conformance to product spec.

Operation No. 0020 7763
B/P Revision
Mfg. Plant

Form E58-784 (1/84)

Printed in U

Manufacturing Instruction Sheet #SC- 007

INSTRUCTIONS FOR ELECTRICAL CALIBRATION OF MOISTURE METERS

Revision A
3-19-74
Revision B
5-20-74

EQUIPMENT REQUIRED:

1. V.T.V.M. with 20 Meg. Probe.
2. Frequency Meter.
3. Glass Beads, calibrated.
4. Tuning Wand T-43962.
5. Tuning Handle T-47049.

SET-UP:

1. Set V.T.V.M. to 15 V.D.C. range.
2. Set Freq. Meter to MHZ range.
3. Connect ground leads of both meters to fixture frame.
4. Put Moisture Meter in fixture and plug into 120V line.

OSCILLATOR ADJUSTMENT (When boards are pre-caled)

1. Adjust balance control to half plates, set dial to red balance line.
2. Turn "Bal.On" knob to Bal. position, and adjust "Cal" control on board until bal. meter is at zero. Use Tool # T-47049.
3. Connect V.T.V.M. with 20 MEG, probe to "Cal" control.
4. Using tuning wand, T-43962, turn slug of coil for max. output of 1st peak, must be between 7 to 7.5V.
5. Repeat steps 2,3 & 4 if necessary; balance meter must be at zero when coil is peaked.
6. Remove leads of V.T.V.M. from board.
7. Using frequency meter, check frequency output by connecting probe to yellow lead on cell and turn "Bal. On" switch to on position. Meter must read between 2 & 2.4 MHZ.
8. Remove frequency meter from board.

A. PB-70 only - Use straight edge to check that main dial capacitor is closed. Line under "L" in "Scale" must be under lower fiducial line.

CALIBRATING "SPAN" CONTROL

1. Make sure "Bal" control is at 50% and set dial to "Bal" line on fiducial (scale A-60), check for meter zero, adjust for zero, if necessary, with "Cal" control.
2. Using Hopper T-40166, dump beads. (A-10-606-1).
3. Adjust main dial to <u>exactly</u> A-23.
4. Turn switch to On position. Adjust "Span" control for meter zero.
5. Remove beads and repeat adjustments 1 through 4 until no further adjustments are necessary.
6. Turn dial to A-10 and turn "Bal" control making sure meter passes through both sides of center. Repeat above using dial setting of 110.

A. 7. PB-71 only - Set dial with mark at F Corr 1.50 - 3.25 under fiducial line. Balance meter with Bal. Cap. Turn dial to next balance position and must read 90 - 100 on "A" Scale.

B. 8. PB-70 only - Set dial with A-60 aligned with <u>upper</u> fiducial (upside-down 60). Balance meter. Turn dial and find balance at a second dial position. This position must be between A-100 and A-110 (using lower fiducial).

P-2830

PB-70 MOISTURE METER CALIBRATION

1. Plug in power source.
2. Note power-off rest position of meter. This is the "Null" point which the power-on calibration point must match.
3. Set dial at A-23 on bottom fiducial.
4. Press red button to turn on power. Meter should move to ~~right~~ left.
5. Dump bead sample into hopper.
6. Press red button. Adjust brass trimmer screw to null the meter. (No movement from rest position).
7. Insert hex tool into coil and turn C.C.W. until it stops. Meter should have moved to ~~left~~ right.
8. Turn Coil C.W. to bring meter back to right. Stop just before the meter starts to move left again. (This set point will not necessarily be at the center of the meter).
9. Re-adjust the trimmer screw to null the meter. (No movement).
10. Press voltage drop button in power cord. Meter should not move from rest position. Very small deviations may be corrected by moving the dial within limits of A-21 to A-25 to null the meter.
12. ~~11~~. Insert probe into beads. Frequency counter must indicate 2.0 to 2.4.
11. ~~12~~. Unplug power source. Connect battery and check meter null as in step 9.

TROUBLESHOOTING GUIDE FOR PB-70 MOISTURE TESTER MODEL 400 & 400B

FAULT	DESCRIPTION	POSSIBLE REMEDIES
A-Scale 60 will not calibrate	Cal. trimmer out of range	1. Add C16 as required 2. Check main dial alignment 3. Check for correct wiring
A-Scale 23 (400 only) will not calibrate	Span trimmer out of range	1. Add C15 as required 2. Check main dial alignment 3. Check for correct wiring
Will not hold calibration	Null will not repeat (400 only)	1. Check D1 & D2 2. Check Q1 3. Check for cold solder joints 4. Check switch contacts
Unstable meter	Null point floats	1. Check Q1 2. Check D1 & D2 3. Check T1 4. Check power voltage 5. Check for cold solder joints
Meter pegs left	Cannot null balance with trimmer or balance capacitor	1. Check D1 & D2 2. Check for correct wiring
Meter pegs right	Same as above (400 only)	1. 1 and 2 above 2. Balance capacitor plates shorted 3. Check for cold solder joints
Dead unit	No meter response	1. Check Q1 2. Check T1 3. Check power voltage 4. Check for correct wiring
Unit will not peak		1. Check Q1 2. Check T1 3. Check power voltage

TEST SPECIFICATIONS FOR MODEL 400 B MOISTURE METER

A. Mechanical Specifications

1. Main variable capacitor must be fully closed ± 1° with dial at counterclockwise index mark.

2. Hair line on top and bottom fiducial must coincide with respective index marks to a tolerance of ± 1°.

3. Clearance between dial and fiducials must be 1/16 inch, ± 1/32 inch at all points.

B. Electrical

1. Check meter zero with power OFF. Needle shall be within Ball area.

2. For electrical tests D.C. supply voltage shall be 9 ± 1 volt D.C.

3. Using trip hopper and standard bead sample A-10-606-3 load tester.

4. Set coil core at full CCW travel (circuit load end of coil) and main dial for balance condition.

5. Adjust coil core CW noting that balance meter will start to deflect to the left. Further CW adjustment will produce a sharp balance meter null back to the RIGHT. Adjust core for this null position and back off CCW 1/8 of a turn.

6. Adjust capacitor C-6 for an A scale reading of 23 ± .5 and recheck tuning per step 5.

7. Oscillator frequency shall be 2.2 MHz ± 0.2 MHz.

8. Tapping instrument with rubber mallet must show freedom from intermittent operation.

9. Subsequent cal check using A-10-606-3 bead sample shall provide an A scale reading of 23 ± 2 division and calibration curve shall pass through A scale 123 ± 4 div. with 20.0 MMF test capacitor.

BD-51842

TOLERANCES - UNLESS OTHERWISE SPECIFIED ARE:
TWO PLACE DECIMALS (.XX) ± —
THREE PLACE DECIMALS (.XXX) ± —
ANGULAR ± 1°

EATON

DR. BY R.W.S. DATE 1-6-77
CH. BY JLD DATE 1-6-77
DES. APP. DATE
DEV. APP. MW DATE 1-6-77
MATERIAL: —
RELS'D.: DATE 1-6-77 AUTH. 3115-1
SCALE: —

TITLE
TEST SPECIFICATIONS
FOR M-400 B M.M.

DWG. No. BD-51842

Eaton Corporation
Automotive and Appliance Controls Operation
Carol Stream, Illinois 60187

REVISIONS

(9)

EL 57-A BEAD METER CALIBRATION CHECK

1. Balance bead meter empty in normal way.
2. Plug "Bead Meter Standard" into posts mounted on right side of meter.* Balance meter will peg to the right.
3. Rebalance bead meter as would be done with bead sample.
4. Bead meter must balance at A-160 ± ½ division.

*The Bead Meter Standard is identified 'CM-1'. Be sured to push this module all the way into the posts.

PROCEDURE TO CHECK "BEAD METER STANDARD"

1. Balance empty at 0 with Standard Capacitor (No. 722) connected and set to 9.99 P.f. Turn switch at top of bead meter for this purpose to the proper position.
2. Set Standard Capacitor to read 1.57 P.f. Bead meter should rebalance with main dial. Reading should be 160 ± 1* on the "A" scale.

*133±1 for AES' bead meter.

3. When the first two steps have been completed, plug in "Bead Meter Standard" and balance meter. Reading should be 160 ± 1 on the "A" scale.

*133±1 for AES.

SC-027
April 7, 1976
Rev. 1 11-10-76

MOISTURE METER SCALE CALIBRATION

1. Assemble scale on moisture meter being certain that all four axles are free to rotate.

2. Attach calibration weight GA-73324 (5 ounces less .5 gram = 141.25 gram) to trimount stud in cup.

3. Adjust screw in scale beam to move weight and balance the scale. Check scale by adding beads GA-46009 to cup. Scale must balance (top of beam horizontal) with zero to 12 beads* in cup and beam must move beyond the balance point to mechanical stop** when up to 4 additional beads are added.

   * Twelve beads weigh approximately .96 grams and four beads weigh approximately .3 grams. (See A-10-696.)

   **Since the PB-70 has no mechanical stop the "out-of-balance" condition is considered to occur when the beam is at an angle equal to the angle of the beam of a PB-71 scale when at the mechanical stop.

SC-~~043~~ 043
Rev. 1
10-21-77

MANUFACTURING INSTRUCTIONS

INSTRUCTIONS TO BEAD METER USE (E-806) FOR CALIBRATION OF MOISTURE METER GLASS BEAD SAMPLE

Preliminary Instructions:

Keep hands clear of balance indicating meters and the posts extending out of right side of the bead meter.

Avoid placing hands against sides of bead meter.

Avoid bumping or moving the bead meter during a test.

All alignments and readings are made from scale A on the large dial and the bottom end of the reference line on its fiducial.

Balance of the bead meter is indicated by the meter in the upper left hand corner.

Always view the balance meter pointer from the same position when using it.

After you are finished using the bead meter, return it to the balance mode.

Make sure the drawer is in bead meter, no beads are in hopper or inside, and no beads are in the drawer. (Check in the order described to prevent spilling beads.)

Switch on upper right of front panel must be in the "Normal" position (to the left).

BEAD SAMPLE TEST PROCEDURE

1) Carefully and slowly pour bead sample into hopper. Ideally the beads should be piled neatly in the center of the hopper.

2) Again make sure drawer is in bead meter (on right side).

3) Turn the large dial to make the indicated A Scale "0" mark appear directly under the line on the lower end of the clear plastic fiducial.

4) Make balance meter show balance using the knob to the right and above the large dial.

5) Drop bead sample from the hopper into the cell by pushing the lever to the left of the hopper all the way down. The balance meter pointer will swing to the extreme right to indicate "Over" condition.

6) Turn large dial to make the indicated "Cal" mark appear directly under the line on the lower end of the clear plastic fiducial.

7) The balance meter pointer will now indicate whether the bead sample is under or over size. If the balance meter pointer can be made to show balance by turning the large dial in either direction no further than one of the small marks on either side of the "Cal" mark, the sample is good.

8) The bead sample is removed from the bead meter by slowly depressing the knob to the right of the hopper all the way down. Pull drawer out of the right hand side of the bead meter (only after first depressing the lever).

9) If the sample is not good add beads to sample for the "Under" condition or remove them for the "Over". How many to add or remove will have to be determined by trial and error.

10) If the sample is good recheck it once more so that the bead sample shows good twice.

When you are finished with the bead meter return the large dial to the "0" mark so that the balance meter pointer is near the balance mark.

9-23-81

BY WEIGHT: 343 GRAMS
12.11 OZ.

BEAD METER CALIBRATION CHECK

1. Balance bead meter empty in normal way.
2. Plug "Bead Meter Standard" into posts mounted on right side of meter.* Balance meter will peg to the right.
3. Rebalance bead meter as would be done with bead sample.
4. Bead meter must balance at A-166.5 ± 1 division (A-132 ± 1 for A.E.S.).

*The "Bead Meter Standard" is identified "CM-1" (CM-2 for A.E.S.). Be sure to push this module all the way into the posts.

PROCEDURE TO CHECK "BEAD METER STANDARD"

1. Put switch at upper right (next to balance control) off "Normal".
2. Balance empty at 0 with Standard Capacitor (No. 722) connected and set to 9.99 P.f.
3. Set Standard Capacitor to read 1.57 P.f. Bead meter should rebalance with main dial. Reading should be 166.5 ± 1 on the "A" scale (132 ± 1 div. for A.E.S.).
4. As a final check test the meter again with the Bead Meter Standard Module used above.

MANUFACTURING INSTRUCTION SC-014

MOISTURE METER BEAD CLEANING

1. Rinse beads thoroughly with warm water. (DO NOT use soaps or detergents.)

2. Rinse beads 3 times with methyl alcohol (methanol) to remove water.

EATON

Process Instruction Sheet

Part No. PB-70-ALL & PB-71-ALL
Operation No. Repair
B/P Revision

Prepared By: R. Evensen
Approved By: M Ciciuszki

Part Name: Moisture Tester
Date: 7-23-80 Issue: 1 Sheet 1 Of 1

Operation Description: Analyze cause of electrical malfunction.

Tool and Gage Numbers	Description	Tool and Gage Numbers	Description

Sketch

FAULT	DESCRIPTION	POSSIBLE REMEDIES
A-Scale 23 will not calibrate.	Cal trimmer out of range.	1. Check for correct wiring. 2. Check main dial alignment. 3. Add C16 as required.
Will not hold calibration.	Null will not repeat.	1. Check for cold soldering. 2. Wires not taped to panel. 3. Check Q1. 4. Check D1 & D2.
Unstable meter.	Null point floats.	1. Check for cold soldering. 2. Check T1. 3. Check Q1. 4. Check D1 & D2. 5. Check power input voltage.

Instructions

Meter pegs left or right.	Cannot null balance meter.	1. Check for correct wiring. 2. Check for solder shorts. 3. Check D1 & D2.
Dead unit.	No meter response.	1. Check for correct power input voltage. 2. Check T1. 3. Check D3, Q1. 4. Check for correct wiring.
Unit will not peak.		1. Check input power voltage. 2. Check T1. 3. Check T1 for broken core. 4. Check Q1.

Special Notes: Refer to product drawings and specifications for part identification and location.

Part No. PB-70-ALL & PB-71-ALL
Operation No. Repair
B/P Revision

(18)